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Exercise - I (Conceptual Questions) Build Up Your Understanding

ELECTROLYTIC CONDUCTANCE

1. Strong electrolytes are those which :
(1) Dissolve readily in water
(2) Conduct electricity
(3) Dissociate into ions even at high concentration
(4) Dissociate into ions at high dilution.

2. Molten sodium chloride conducts electricity due to the presence of :
(1) Free electrons
(2) Free ions
(3) Free molecules
(4) free atoms of Na and Cl

3. Electrolytic conduction is due to the movement of:
(1) Molecules (2) Atoms
(3) Ions (4) Electrons

4. Which of the following solutions of KCl has the lowest value of equivalent conductance ?
(1) 1 M (2) 0.1 M
(3) 0.01 M (4) 0.001 M

5. If the specific resistance of a solution of concentration C geq L^{-1} is R, then its equivalent conductance is :
(1) $\frac{100R}{C}$ (2) $\frac{RC}{1000}$
(3) $\frac{1000}{RC}$ (4) $\frac{C}{1000R}$

6. The specific conductances in ohm^{-1} cm^{-1} of four electrolytes P, Q, R and S are given in brackets:
P (5.0×10^{-5}) Q (7.0×10^{-8})
R (1.0×10^{-10}) S (9.2×10^{-3})
The one that offers highest resistance to the passage of electric current is
(1) P (2) S
(3) R (4) Q

7. The specific conductance of a salt of 0.01 M concentration is 1.061×10^{-4} S cm^{-1}. Molar conductance of the same solution will be :
(1) 1.061×10^{-4} S cm^2 mol^{-1}
(2) 1.061 S cm^2 mol^{-1}
(3) 10.61 S cm^2 mol^{-1}
(4) 106.1 S cm^2 mol^{-1}

8. Which statement is not correct :–
(1) Conductance of an electrolytic solution increases with dilution
(2) Conductance of an electrolytic solution decreases with dilution
(3) Specific conductance of an electrolytic solution decreases with dilution
(4) Equivalent conductance of an electrolytic solution increases with dilution.

9. The resistance of 0.01 N solution of an electrolyte was found to be 210 ohm at 298 K using a conductivity cell of cell constant 0.66 cm^{-1}. The equivalent conductance of solution is :–
(1) 314.28 mho cm^2 eq^{-1}
(2) 3.14 mho cm^2 eq^{-1}
(3) 314.28 mho^{-1} cm^2 eq^{-1}
(4) 3.14 mho^{-1} cm^2 eq^{-1}

10. Electrolytic conduction differs from metallic conduction from the fact that in the former
(1) The resistance increases with increasing temperature
(2) The resistance decreases with increasing temperature
(3) The resistance remains constant with increasing temperature
(4) The resistance is independent of the length of the conductor

11. The specific conductance of a 0.01 M solution of KCl is 0.0014 ohm^{-1} cm^{-1}at 25° C. Its equivalent conductance (cm^2 ohm^{-1} eq^{-1}) is :–
(1) 140 (2) 14 (3) 1.4 (4) 0.14

12. Which one of the following is wrong :–
(1) Specific conductance increases on dilution.
(2) Specific conductance decreases on dilution.
(3) Equivalent conductance increases on dilution.
(4) Molar conductance increases on dilution.

KOHLRAUSCH LAW

13. At infinite dilution, the equivalent conductances of CH_3COONa, HCl and CH_3COOH are 91, 426 and 391 mho cm^2 eq^{-1} respectively at 25°C. The eq. conductance of NaCl at infinite dilution will be :
(1) 126 (2) 209 (3) 391 (4) 908

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14. For HCl solution at 25°C, equivalent conductance at infinite dilution is 425 ohm^{-1} cm^2 eq^{-1}. The specific conductance of a solution of HCl is 3.825 ohm^{-1} cm^{-1}. If the degree of dissociation is 90%, the normality of the solution is :-

(1) 0.90 N (2) 1.0 N (3) 10 N (4) 1.2 N

15. The molar conductivities $\wedge^0_{NaOAc}$ and $\wedge^0_{HCl}$ at infinite dilution in water at 25°C are 91.0 and 426.2 S cm^2 mol^{-1} respectively. To calculate $\wedge^0_{HOAc}$ the additional value required is :

(1) $\wedge^0_{NaCl}$ (2) $\wedge^0_{H_2O}$

(3) $\wedge^0_{KCl}$ (4) $\wedge^0_{NaOH}$

16. The molar conductance of $AgNO_3$, AgCl and NaCl at infinite dilution are 116.5, 121.6 and 110.3 S cm^2 mol^{-1} respectively. The molar conductance of $NaNO_3$ is :

(1) 111.4 S cm^2 mol^{-1} (2) 105.2 S cm^2 mol^{-1}

(3) 130.6 S cm^2 mol^{-1} (4) 150.2 S cm^2 mol^{-1}

17. The conductivity of a saturated solution of $BaSO_4$ is 3.06×10^{-6} ohm^{-1} $cm^{-1}$and its molar conductance is 1.53 ohm^{-1} cm^2 mol^{-1}. The K_{sp} of $BaSO_4$ will be

(1) 4×10^{-12} (2) 2.5×10^{-9}

(3) 2.5×10^{-13} (4) 4×10^{-6}

18. Kohlrausch's law states that at :-

(1) Infinite dilution, each ion makes definite contribution to conductance of an electrolyte whatever be the nature of the other ion of the electrolyte.

(2) Infinite dilution, each ion makes definite contribution to equivalent conductance of an electrolyte whatever be the nature of the other ion of the electrolyte.

(3) Finite dilution, each ion makes definite contribution to equivalent conductance of an electrolyte whatever be the nature of the other ion of the electrolyte.

(4) Infinite dilution, each ion makes definite contribution to equivalent conductance of an electrolyte depending on the nature of the other ion of electrolyte.

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GALVANIC CELL

19. In the galvanic cell

Cu(s) $|Cu^{2+}$ (1 M) || Ag^+ (1 M) | Ag(s) the electrons will travel in the external circuit :

(1) From Ag to Cu

(2) From Cu to Ag

(3) Electrons do not travel in the external circuit

(4) In any direction

20. The direction of current in the Daniell cell when Zn and Cu electrodes are connected is :

(1) From Cu to Zn in the cell

(2) From Cu to Zn out side the cell

(3) From Zn to Cu outside the cell

(4) In any direction in the cell

21. The equation representing the process by which standard reduction potential of zinc can be defined is

(1) Zn^{2+} (s) + $2e^-$ ⟶ Zn (s)

(2) Zn (g) ⟶ Zn^{2+} (g) + $2e^-$

(3) Zn^{2+} (g) + $2e^-$ ⟶ Zn (s)

(4) Zn^{2+} (aq.) + $2e^-$ ⟶ Zn (s)

22. A standard hydrogen electrode has zero electrode potential because :

(1) Hydrogen is easiest to oxidize.

(2) This electrode potential is assumed to be zero.

(3) Hydrogen atom has only one electron.

(4) Hydrogen is the lightest element.

23. Which is not true for a standard hydrogen electrode ?

(1) The hydrogen ion concentration is 1 M.

(2) Temperature is 25°C.

(3) Pressure of hydrogen is 1 bar.

(4) It contains a metallic conductor which does not adsorb hydrogen.

24. E° for the half cell

Zn^{2+} | Zn is –0.76 V. E.M.F. of the cell

Zn | Zn^{2+} (1M) || H^+ (1M) | H_2 (1 atm) is :

(1) –0.76 V (2) +0.76 V

(3) –0.38 V (4) + 0.38 V

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25. $Cu(s)|Cu^{+2}(1\ M)|Zn^{+2}(1\ M)|Zn(s)$

A cell represented above should have emf.

(1) Positive

(2) Negative

(3) Zero

(4) Cannot be predicted

26. Given electrode potentials :

$Fe^{3+} + e \longrightarrow Fe^{2+}$; $E° = 0.771$ V

$I_2 + 2e \longrightarrow 2I^-$; $E° = 0.536$ V

$E°_{cell}$ for the cell reaction

$2Fe^{3+} + 2I^- \rightarrow 2Fe^{2+} + I_2$ is -

(1) $(2 \times 0.771 - 0.536) = 1.006$ V

(2) $(0.771 - 0.5 \times 0.536) = 0.503$ V

(3) $0.771 - 0.536 = 0.235$ V

(4) $0.536 - 0.771 = -0.235$ V

27. Which of the following is not an anodic half reaction:-

(1) $Ag^+ \rightarrow Ag - e^-$

(2) $Cu \rightarrow Cu^{2+} + 2e^-$

(3) $Fe^{2+} \rightarrow Fe^{3+} + e^-$

(4) $4OH^- \rightarrow 2H_2O + O_2 + 4e^-$

28. Which of the following statements is correct :–

(1) Oxidation occurs at anode in both galvanic and electrolytic cell.

(2) Reduction occurs at anode in both galvanic and electrolytic cell

(3) Reduction occurs at anode in electrolytic cell where as oxidation occurs at cathode in galvanic cell

(4) Oxidation occurs at anode in electrolytic cell where as reduction occurs at anode in a galvanic cell,

29. Other things being equal, the life of a Daniell cell may be increased by :–

(1) Keeping low temperature

(2) Using large copper electrode

(3) Decreasing concentration of copper ions

(4) Using large zinc electrodes

ELECTROCHEMICAL SERIES

30. Zn can not displace following ions from their aqueous solution :-

(1) Ag^+ (2) Cu^{2+} (3) Fe^{2+} (4) Na^+

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31. The standard reduction potentials at 25 °C for the following half reactions are given against each :-

$Zn^{2+}(aq) + 2e^- \ell Zn(s)$, –0.762 V

$Cr^{3+}(aq) + 3e^- \ell Cr(s)$, –0.740 V

$2H^+ + 2e^- \ell H_2(g)$, 0.00 V

$Fe^{3+} + 2e^- \ell Fe^{2+}$, 0.77 V

Which is the strongest reducing agent ?

(1) Zn (2) Cr

(3) $H_2(g)$ (4) $Fe^{2+}(aq)$

32. Using the standard electrode potential values given below, decide which of the statements, I, II, III and IV are correct. Choose the right answer from (1), (2), (3) and (4).

$Fe^{2+} + 2e^- \ell Fe$; $E° = -0.44$ V

$Cu^{2+} + 2e^- \ell Cu$; $E° = +0.34$ V

$Ag^+ + e^- \ell Ag$; $E° = +0.80$ V

I. Copper can displace iron from $FeSO_4$ solution.

II. Iron can displace copper from $CuSO_4$ solution.

III. Silver can displace copper from $CuSO_4$ solution.

IV. Iron can displace silver from $AgNO_3$ solution.

(1) I and II (2) II and III

(3) II and IV (4) I and IV

33. The standard electrode potentials for the elements A, B and C are 0.68, –2.50 and 0.50 V respectively. The order of their reducing power is :

(1) A > B > C (2) A > C > B

(3) C > B > A (4) B > C > A

34. The oxidation potential of Zn, Cu, Ag, H_2 and Ni electrodes are 0.76 V, –0.34 V, –0.80 V, 0 V, 0.55 V respectively. Which of the following reaction will provide maximum voltage ?

(1) $Zn + Cu^{2+} \longrightarrow Cu + Zn^{2+}$

(2) $Zn + 2Ag^+ \longrightarrow 2Ag + Zn^{2+}$

(3) $H_2 + Cu^{2+} \longrightarrow 2H^+ + Cu$

(4) $H_2 + Ni^{2+} \longrightarrow 2H^+ + Ni$

35. The standard reduction potential at 25°C of Li^+/Li, Ba^{2+}/Ba, Na^+/Na and Mg^{2+}/Mg are –3.05 V, –2.73 V, –2.71 V and –2.37 V respectively. Which one of the following is the strongest oxidising agent ?

(1) Na^+ (2) Li^+ (3) Ba^{2+} (4) Mg^{2+}

36. A gas X at 1 atm is bubbled through a solution containing a mixture of 1 M Y^- and 1 M Z^- at 25°C. If the reduction potential of $(Z/Z^-)>(Y/Y^-)>(X/X^-)$ then :

(1) Y will oxidise X^- and not Z^-

(2) Y will oxidise Z^- and not X^-

(3) Y will oxidise both X^- and Z^-

(4) Y will reduce both X^- and Z^-

37. The standard electrode potential of Zn, Ag and Cu electrodes are –0.76 V, 0.80 V and 0.34 V respectively, then :

(1) Ag can oxidise Zn and Cu

(2) Ag can reduce Zn^{2+} and Cu^{2+}

(3) Zn can reduce Ag^+ and Cu^{2+}

(4) Cu can oxidise Zn and Ag

38. Standard reduction potentials of four metal electrodes are

A = – 0.250 V, B = – 0.140 V

C = – 0.126 V, D = – 0.402 V

The metal that displaces A from aqueous solution of its compounds is :-

(1) B (2) C

(3) D (4) None of the above

39. The following four colourless salt solutions are placed in separate test tubes and a strip of Cu is placed in each solution. Which solution finally turns blue :–

(1) $Zn(NO_3)_2$ (2) $Mg(NO_3)_2$

(3) KNO_3 (4) $AgNO_3$

40. Which of the following displacement does not occur

(1) $Zn + 2H^+ \rightarrow Zn^{2+} + H_2\uparrow$

(2) $Fe + 2Ag^+ \rightarrow Fe^{2+} + Ag\downarrow$

(3) $Cu + Fe^{2+} \rightarrow Cu^{2+} + Fe\downarrow$

(4) $Zn + Pb^{2+} \rightarrow Zn^{2+} + Pb\downarrow$

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41. On the basis of the following E° values, the strongest oxidizing agent is :-

$[Fe(CN)_6]^{4-} \rightarrow [Fe(CN)_6]^{3-} + e^{-1}, E° = -0.35$ V

$Fe^{2+} \rightarrow Fe^{3+} + e^{-1}$; E° = – 0.77 V

(1) Fe^{3+} (2) $[Fe(CN)_6]^{3-}$

(3) $[Fe(CN)_6]^{4-}$ (4) Fe^{2+}

NERNST EQUATION

42. $E°(Ni^{2+}/Ni) = -0.25$ V

$E°\ (Au^{3+}\ /\ Au) = 1.50$ V

The emf of the voltaic cell.

$Ni\ |\ Ni^{2+}\ (1.0\ M)\ ||\ Au^{3+}\ (1.0\ M)\ |\ Au$ is :

(1) 1.25 V (2) –1.75 V

(3) 1.75 V (4) 4.0 V

43. The emf of the cell $Tl(s)|Tl^+$ (0.0001 M)|| Cu^{2+} (0.01M)|Cu(s) is 0.83 V The emf of this cell will be increased by :–

(1) Increasing the concentration of Cu^{+2} ions

(2) Decreasing the concentration of Tl^+

(3) Increasing the concentration of both

(4) (1) & (2) both

44. Which of the following represents the electrode potential of silver electrode dipped into 0.1 M $AgNO_3$ solution at 25° C ?

(1) $E°_{red}$ (2) $(E°_{red} + 0.059)$

(3) $(E°_{ox} - 0.059)$ (4) $(E°_{red} - 0.059)$

45. The electrode potential of a hydrogen electrode dipped in solution of pH = 1 is

(1) 0.059 V (2) 0.00 V

(3) –0.059 V (4) 0.59 V

46. Consider the reaction

$Cl_2(g) + 2Br^-(aq) \longrightarrow 2Cl^-(aq) + Br_2(\ell)$

The emf of the cell when

$[Cl^-] = [Br^-] = 0.01$ M and Cl_2 gas at 0.25 atm pressure will be (E° for the above reaction is = 0.29 V)

(1) 0.54 V (2) 0.272 V

(3) 0.29 V (4) –0.29 V

47. The standard emf for the cell reaction

$Zn + Cu^{2+} \longrightarrow Zn^{2+} + Cu$ is 1.10 V at 25°C. The emf for the cell reaction when 0.1 M Cu^{2+} and 0.1 M Zn^{2+} solution are used at 25°C is :

(1) 1.10 V (2) 0.110 V

(3) –1.10 V (4) –0.110 V

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48. $E°$ for $F_2 + 2e^- \rightarrow 2F^-$ is 2.8 V,
$E°$ for $\frac{1}{2}F_2 + e^- \rightarrow F^-$ is ?
(1) 2.8 V (2) 1.4 V
(3) –2.8 V (4) –1.4 V

49. How much will the potential of Zn | Zn^{2+} change if the solution of Zn^{2+} is diluted 10 times
(1) Increases by 0.03 V
(2) Decreases by 0.03 V
(3) Increases by 0.059 V
(4) Decreases by 0.059 V

50. How much will the potential of a hydrogen electrode change when its solution initially at pH = 0 is neutralised to pH = 7 ?
(1) Increases by 0.059 V
(2) Decreases by 0.059 V
(3) Increases by 0.41 V
(4) Decreases by 0.41 V

51. Which of the following will increase the voltage of the cell with following cell reaction
$Sn(s) + 2Ag^+(aq) \rightarrow Sn^{+2}(aq) + 2Ag(s)$
(1) Increase in the size of silver rod
(2) Increase in the concentration of Sn^{+2} ions
(3) Increase in the concentration of Ag^+ ions
(4) Decrease in the concentration of Ag^+ ions

52. $E°$ for the reaction $Fe + Zn^{2+} \rightarrow Zn + Fe^{2+}$ is –0.35 V. The given cell reaction is :
(1) Spontaneous
(2) Non-spontaneous
(3) In equilibrium
(4) Can't say anything

53. For a reaction – $A(s) + 2B^+ \rightleftharpoons A^{2+} + 2B(s)$ K_C has been found to be 10^{12}. The $E°_{cell}$ is:
(1) 0.354 V (2) 0.708 V
(3) 0.0098 V (4) 1.36 V

54. The standard electrode potential ($E°$) for OCl^-/Cl^- and $Cl^- / \frac{1}{2} Cl_2$ respectively are 0.94 V and –1.36 V. The $E°$ value of $OCl^- / \frac{1}{2} Cl_2$ will be :
(1) –2.20 V (2) –0.42 V
(3) 0.52 V (4) 1.04 V

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55. The hydrogen electrode is dipped in a solution of pH = 3 at 25°C. The electrode potential of the half cell would be :
(1) 0.177 V (2) – 0.177 V
(3) 0.087 V (4) 0.059 V

56. What is the potential of the cell containing two hydrogen electrodes as represented below
$Pt; H_2(g) \mid H^+(10^{-8})\ M \parallel H^+(0.001\ M) \mid H_2(g).\ Pt;$
(1) – 0.295 V (2) – 0.0591 V
(3) 0.295 V (4) 0.0591 V

57. Consider the cell $Cu|Cu^{+2} \parallel Ag^+|Ag$. If the concentration of Cu^{+2} and Ag^+ ions becomes ten times, then the emf of the cell will :–
(1) Becomes 10 times
(2) Remains same
(3) Increases by 0.0295 V
(4) Decreases by 0.0295 V

58. The emf of the cell
$Ni|Ni^{+2}$ (1.0 M) | | Au^{+3} (0.1M) |Au
[$E°$ for $Ni^{+2}|Ni$ = –0.25 V,
$E°$ for $Au^{+3}|Au$ = 1.50 V] is given as:-
(1) 1.25 V (2) – 1.75 V
(3) 1.78 V (4) 1.73 V

59. The equilibrium constant (in approx) of the cell reaction :
$Cu(s) + 2Ag^+(aq.) \rightleftharpoons Cu^{+2}(aq.) + 2Ag(s)$
if $E°_{cell}$ = 0.465 V at 298 K is :-
(1) 2.0×10^{10} (2) 3.16×10^{12}
(3) 3.16×10^{15} (4) 4×10^{10}

60. The emf of the cell in which the following reaction
$Zn(s) + Ni^{2+}\ (a = 0.1) \rightleftharpoons Zn^{2+}(a = 1.0) + Ni(s)$
occurs, is found to be 0.5105 V at 298 K. The standard e.m.f. of the cell is :-
(1) –0.5105 V (2) 0.5400 V
(3) 0.4810 V (4) 0.5696 V

61. If $E^{o}_{Fe^{+2}/Fe}$ = – 0.441V and $E^{o}_{Fe^{+3}/Fe^{+2}}$ = 0.771V the standard EMF of the reaction $Fe + 2Fe^{+3} \rightarrow 3Fe^{+2}$ will be :

(1) 0.330 V (2) 1.653 V
(3) 1.212 V (4) 0.111 V

ELECTROLYSIS

62. When an electric current is passed through acidified water, 112 mL of hydrogen gas at STP collects at the cathode in 965 s. The current passed in ampere is :

(1) 1.0 (2) 0.5 (3) 0.1 (4) 2.0

63. Two electrolytic cells one containing acidified ferrous chloride and another acidified ferric chloride are connected in series. The ratio of iron deposited at cathodes in the two cells when electricity is passed through the cells will be :

(1) 3 :1 (2) 2 : 1 (3) 1 : 1 (4) 3 : 2

64. A current of 9.65 A flowing for 10 minute deposits 3.0 g of a metal. The equivalent weight of the metal is :

(1) 10 (2) 30 (3) 50 (4) 96.5

65. How many coulombs of electric charge are required for the oxidation of 1 mol of H_2O to O_2 ?

(1) 9.65×10^4 C (2) 4.825×10^5 C
(3) 1.93×10^5 C (4) 1.93×10^4 C

66. On passing 10800 C through electrolytic solution, 2.977 g of metal (atomic mass 106.4 g mol^{-1}) was deposited, the charge on the metal cation is -

(1) +4 (2) +3 (3) +2 (4) +1

67. On passing electricity through dilute H_2SO_4 solution the amount of substance liberated at the cathode and anode are in the ratio :

(1) 1 : 8 (2) 8 : 1
(3) 16 : 1 (4) 1 : 16

68. During electrolysis of fused calcium hydride, the hydrogen is produced at :

(1) Cathode
(2) Anode
(3) Hydrogen is not liberated at all
(4) H_2 produced reacts with oxygen to form water

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69. A silver cup is plated with silver by passing 965 A current for one second, the mass of Ag deposited is :– (At. wt. of Ag = 107.87)

(1) 9.89 g. (2) 107.87 g.
(3) 1.0787 g. (4) 100.2 g.

70. When electricity is passed through molten $AlCl_3$, 13.5 g Al is deposited. The number of Faradays must be :–

(1) 5.0 (2) 1.0 (3) 1.5 (4) 3.0

71. A solution of sodium sulphate in water is electrolysed using inert electrodes. The product at the cathode and anode are respectively :–

(1) H_2, SO_2 (2) O_2, H_2
(3) O_2, Na (4) H_2, O_2

72. One Faraday of electricity will liberate one mole of the metal from the solution of

(1) Auric chloride ($AuCl_3$)
(2) Silver nitrate
(3) Calcium chloride
(4) Copper sulphate

73. When 96500 C of electricity are passed through molten barium chloride solution, the amount of barium deposited will be :-

(1) 0.5 mol (2) 1.0 mol
(3) 1.5 mol (4) 2.0 mol

74. A factory produces 40 kg of calcium in two hours by electrolysis. How much aluminium can be produced by the same current in two hours :–

(1) 22 kg (2) 18 kg (3) 9 kg (4) 27 kg

75. What would be the ratio of moles of Ag, Cu, Fe that would be deposited by passage of same quantity of electricity through solutions of salts containing Ag^+, Cu^{+2}, Fe^{+3} :-

(1) 1 : 1 : 1 (2) $1 : \frac{1}{2} : \frac{1}{3}$

(3) $\frac{1}{3} : \frac{1}{2} : 1$ (4) 1 : 2 : 3

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76. Electrolysis of aq. $CuSO_4$ causes :–
(1) An increase in pH
(2) A decrease in pH
(3) Either decrease or increase in pH
(4) None

77. The passage of current liberates H_2 at cathode and Cl_2 at anode. The solution is :–
(1) $CuSO_4$ (aq) (2) $CuCl_2$ (aq.)
(3) NaCl (aq.) (4) Water

COMMERCIAL CELLS

78. When lead accumulator is charged, it acts as :
(1) an electrolytic cell (2) a galvanic cell
(3) a Daniel cell (4) none of the above

79. The thermodynamic efficiency of cell is given by -
(1) $\frac{\Delta H}{\Delta G} \times 100$ (2) $\frac{nFE}{\Delta G} \times 100$
(3) $-\frac{nFE}{\Delta H} \times 100$ (4) Zero

EXERCISE-I (Conceptual Questions) ANSWER KEY

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Answer	3	2	3	1	3	3	3	2	1	2	1	1	1	3	1
Question	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Answer	2	4	2	2	2	4	2	4	2	2	3	1	1	4	4
Question	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Answer	1	3	4	2	4	1	3	3	4	3	1	3	4	4	3
Question	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Answer	2	1	1	1	4	3	2	1	3	2	3	3	4	3	2
Question	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Answer	3	1	4	3	3	1	1	2	3	3	4	2	1	2	2
Question	76	77	78	79											
Answer	2	3	1	3											

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Exercise - II (Previous Year Questions) AIPMT/NEET

AIPMT 2009

1. Given : (i) $Cu^{2+} + 2e^- \rightarrow Cu$, $E^\circ = 0.337$ V
(ii) $Cu^{2+} + e^- \rightarrow Cu^+$, $E^\circ = 0.153$ V
Electrode potential, E° for the reaction, $Cu^+ + e^- \rightarrow Cu$, will be :-
(1) 0.38 V (2) 0.52 V
(3) 0.90 V (4) 0.30 V

2. The equivalent conductance of $\frac{M}{32}$ solution of a weak monobasic acid is 8.0 mho cm^2 eq^{-1} and at infinite dilution is 400 mho cm^2 eq^{-1}. The dissociation constant of this acid is :-
(1) 1.25×10^{-4} (2) 1.25×10^{-5}
(3) 1.25×10^{-6} (4) 6.25×10^{-4}

3. Al_2O_3 is reduced by electrolysis at low potential and high current. If 4.0×10^4 A of current is passed through molten Al_2O_3 for 6 hours, what mass of aluminium is produced? (Assume 100% current efficiency, At. mass of Al = 27 g mol^{-1})
(1) 1.3×10^4 g (2) 9.0×10^3 g
(3) 8.1×10^4 g (4) 2.4×10^5 g

AIPMT 2010

4. An increase in equivalent conductance of a strong electrolyte with dilution is mainly due to:-
(1) Increase in number of ions.
(2) Increase in ionic mobility of ions.
(3) 100% ionisation of electrolyte at normal dilution.
(4) Increase in both i.e. number of ions and ionic mobility of ions.

5. Consider the following relations for emf of a electrochemical cell :
(a) emf of cell = (Oxidation potential of anode) – (Reduction potential of cathode)
(b) emf of cell = (Oxidation potential of anode) + (Reduction potential of cathode)
(c) emf of cell = (Reduction potential of anode) + (Reduction potential of cathode)
(d) emf of cell = (Oxidation potential of anode) – (Oxidation potential of cathode)
Which of the above relations are correct :
(1) (a) and (b) (2) (c) and (d)
(3) (b) and (d) (4) (c) and (a)

6. Which of the following expressions correctly represents the equivalent conductance of $Al_2(SO_4)_3$ at infinite dilution. Given that $\Lambda^\circ_{Al^{3+}}$ and $\Lambda^\circ_{SO_4^{2-}}$ are the equivalent conductances at infinite dilution of the respective ions :-
(1) $\Lambda^\circ_{Al^{3+}} + \Lambda^\circ_{SO_4^{2-}}$
(2) $\left(\Lambda^\circ_{Al^{3+}} + \Lambda^\circ_{SO_4^{2-}}\right) \times 6$
(3) $\frac{1}{3}\Lambda^0_{Al^{3+}} + \frac{1}{2}\Lambda^0_{SO_4^{2-}}$
(4) $2\Lambda^\circ_{Al^{3+}} + 3\Lambda^\circ_{SO_4^{2-}}$

7. For the reduction of silver ions with copper metals, the standard cell potential was found to be +0.46 V at 25 °C. The value of standard Gibbs energy. ΔG° will be (F = 96500 C mol^{-1})
(1) –98.0 kJ (2) –89.0 kJ
(3) –89.0 J (4) –44.5 kJ

AIPMT Pre. 2011

8. Standard electrode potential of three metals X, Y and Z are –1.2 V, +0.5 V and –3.0 V respectively. The reducing power of these metals will be :-
(1) Y > Z > X (2) Y > X > Z
(3) Z > X > Y (4) X > Y > Z

9. The electrode potentials for $Cu^{2+}(aq) + e^- \rightarrow Cu^+(aq)$ and $Cu^+(aq) + e^- \rightarrow Cu(s)$ are +0.15 V and +0.50 V respectively. The value of $E^0_{Cu^{+2}/Cu}$ will be :-
(1) 0.500 V (2) 0.325 V
(3) 0.650 V (4) 0.150 V

TG: @Chalnaayaaar

TG: @Chalnaayaaar

10. Standard electrode potential for Sn^{4+}/Sn^{2+} couple is +0.15 V and that for the Cr^{3+}/Cr couples is –0.74 V. These two couples in their standard state are connected to make a cell. The standard cell potential will be :-

(1) +1.19 V (2) +0.89 V

(3) +0.18 V (4) +1.83 V

11. If the $E°_{cell}$ for a given reaction has a negative value, then which of the following gives the correct relationship for the values of $\Delta G°$ and K_{eq}?

(1) $\Delta G° > 0; K_{eq} > 1$ (2) $\Delta G° < 0; K_{eq} > 1$

(3) $\Delta G° < 0; K_{eq} < 1$ (4) $\Delta G° > 0; K_{eq} < 1$

AIPMT Mains 2011

12. A solution contains Fe^{2+}, Fe^{3+} and I^- ions. This solution was treated with iodine at 35 °C. E° for $Fe^{3+} | Fe^{2+}$ is +0.77 V and E° for $I_2|2I^-$ = 0.536 V. The favourable redox reaction is :-

(1) Fe^{2+} will be oxidised to Fe^{3+}

(2) I_2 will be reduced to I^-

(3) There will be no redox reaction

(4) I^- will be oxidised to I_2

AIPMT Pre. 2012

13. Limiting molar conductivity of NH_4OH $\left(\text{i.e.}\,\overset{\circ}{\Lambda}_{m(NH_4OH)}\right)$ is equal to:-

(1) $\overset{\circ}{\Lambda}_{m(NH_4OH)} + \overset{\circ}{\Lambda}_{m(NH_4Cl)} - \overset{\circ}{\Lambda}_{m(HCl)}$

(2) $\overset{\circ}{\Lambda}_{m(NH_4Cl)} + \overset{\circ}{\Lambda}_{m(NaOH)} - \overset{\circ}{\Lambda}_{m(NaCl)}$

(3) $\overset{\circ}{\Lambda}_{m(NH_4Cl)} + \overset{\circ}{\Lambda}_{m(NaCl)} - \overset{\circ}{\Lambda}_{m(NaOH)}$

(4) $\overset{\circ}{\Lambda}_{m(NaOH)} + \overset{\circ}{\Lambda}_{m(NaCl)} - \overset{\circ}{\Lambda}_{m(NH_4Cl)}$

AIPMT Mains 2012

14. Molar conductivities (Λ°_{m}) at infinite dilution of NaCl, HCl and CH_3COONa are 126.4, 425.9 and 91.0 S cm^2 mol^{-1} respectively. Λ°_{m} for CH_3COOH will be :-

(1) 290.8 S cm^2 mol^{-1} (2) 390.5 S cm^2 mol^{-1}

(3) 425.5 S cm^2 mol^{-1} (4) 180.5 S cm^2 mol^{-1}

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NEET-UG 2013

15. At 25 °C molar conductance of 0.1 molar aqueous solution of ammonium hydroxide is 9.54 ohm^{-1} cm^2 mol^{-1} and at infinite dilution its molar conductance is 238 ohm^{-1} cm^2 mol^{-1}. The degree of ionisation of ammonium hydroxide at the same concentration and temperature is :-

(1) 40.800 % (2) 2.080 %

(3) 20.800 % (4) 4.008 %

16. A hydrogen gas electrode is made by dipping platinum wire in a solution of HCl of pH = 10 and by passing hydrogen gas around the platinum wire at 1 atm pressure. The oxidation potential of electrode would be ?

(1) 1.18 V (2) 0.059 V

(3) 0.59 V (4) 0.118 V

17. A button cell used in watches function as following

$Zn(s)+Ag_2O(s)+H_2O(\ell) \rightleftharpoons 2Ag(s)+Zn^{2+}(aq)+2OH^-(aq)$ If half cell potentials are

$Zn^{2+}(aq) + 2e^- \rightarrow Zn(s)$; E° = –0.76 V

$Ag_2O(s) + H_2O(\ell) + 2e^- \rightarrow 2Ag(s) + 2OH^-(aq)$;

E° = 0.34 V

The standard cell potential will be :-

(1) 1.34 V (2) 1.10 V

(3) 0.42 V (4) 0.84 V

AIPMT 2014

18. When 0.1 mol MnO_4^{2-} is oxidised the quantity of electricity required to completely oxidise MnO_4^{2-} to MnO_4^- is :-

(1) 96500 C (2) 2 × 96500 C

(3) 9650 C (4) 96.50 C

19. The weight of silver (at wt. = 108) displaced by a quantity of electricity which displaces 5600 mL of O_2 at STP will be :-

(1) 5.4 g (2) 10.8 g

(3) 54.0 g (4) 108.0 g

AIPMT 2015

20. A device that converts energy of combustion of fuels like hydrogen and methane, directly into electrical energy is known as :-

(1) Electrolytic cell (2) Dynamo

(3) Ni-Cd cell (4) Fuel Cell

NEET-I 2016

21. The pressure of H_2 required to make the potential of H_2-electrode zero in pure water at 298 K is :-

(1) 10^{-14} atm (2) 10^{-12} atm

(3) 10^{-10} atm (4) 10^{-4} atm

NEET-II 2016

22. The molar conductivity of a 0.5 mol/dm^3 solution of $AgNO_3$ with electrolytic conductivity of 5.76×10^{-3} S cm^{-1} at 298 K is

(1) 0.086 S cm^2/mol

(2) 28.8 S cm^2/mol

(3) 2.88 S cm^2/mol

(4) 11.52 S cm^2/mol

23. During the electrolysis of molten sodium chloride, the time required to produce 0.10 mol of chlorine gas using a current of 3 A is

(1) 220 minutes (2) 330 minutes

(3) 55 minutes (4) 110 minutes

24. If the $E°_{cell}$ for a given reaction has a negative value, which of the following gives the **correct** relationships for the values of $\Delta G°$ and K_{eq} ?

(1) $\Delta G° < 0; K_{eq} > 1$ (2) $\Delta G° < 0; K_{eq} < 1$

(3) $\Delta G° > 0; K_{eq} < 1$ (4) $\Delta G° > 0; K_{eq} > 1$

25. The number of electrons delivered at the cathode during electrolysis by a current of 1 A in 60 s is (charge on electron = 1.60×10^{-19} C)

(1) 3.75×10^{20} (2) 7.48×10^{23}

(3) 6×10^{23} (4) 6×10^{20}

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NEET(UG) 2017

26. In the electrochemical cell :-

$Zn|ZnSO_4(0.01M)||CuSO_4(1.0\ M)|Cu$, the emf of this Daniel cell is E_1. When the concentration of $ZnSO_4$ is changed to 1.0M and that of $CuSO_4$ changed to 0.01M, the emf changes to E_2.

Which one of the relationship is correct between E_1 and E_2?

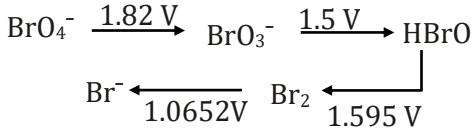
(Given, $\frac{RT}{F} = 0.059$)

(1) $E_1 < E_2$ (2) $E_1 > E_2$

(3) $E_2 = 0 \neq E_1$ (4) $E_1 = E_2$

NEET(UG) 2018

27. Consider the change in oxidation state of Bromine corresponding to different EMF values as shown in the diagram below:



Then the species undergoing disproportionation is:-

(1) BrO_3^- (2) BrO_4^-

(3) Br_2 (4) HBrO

NEET(UG) 2019

28. For a cell involving one electron $E°_{cell} = 0.59V$ at 298 K, the equilibrium constant for the cell reaction is :-

$\left[\text{Given that } \frac{2.303RT}{F} = 0.059V \text{ at } T = 298K\right]$

(1) 1.0×10^2 (2) 1.0×10^5

(3) 1.0×10^{10} (4) 1.0×10^{30}

29. For the cell reaction

$2Fe^{3+}(aq) + 2I^-(aq) \rightarrow 2Fe^{2+}(aq) + I_2(aq)$

$E^o_{cell} = 0.24V$ at 298 K. The standard Gibbs energy $(\Delta_r G^o)$ of the cell reaction is :

[Given that Faraday constant F = 96500 C mol^{-1}]

(1) – 46.32 kJ mol^{-1} (2) – 23.16 kJ mol^{-1}

(3) 46.32 kJ mol^{-1} (4) 23.16 kJ mol^{-1}

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NEET(UG) (Odisha) 2019

30. Following limiting molar conductivities are given as $\lambda^0_{m(H_2SO_4)} = x\ S cm^2\ mol^{-1}$

$\lambda^0_{m(K_2SO_4)} = y\ S cm^2\ mol^{-1}$

$\lambda^0_{m(CH_3COOK)} = z\ S cm^2\ mol^{-1}$

λ^0_m (in S cm^2 mol^{-1}) for CH_3COOH will be-

(1) x – y + 2 z (2) x + y – z

(3) x – y + z (4) $\frac{(x-y)}{2} + z$

31. The standard electrode potential (E°) values of $Al^{3+}|Al$, $Ag^+|Ag$, $K^+|K$ and $Cr^{3+}|Cr$ are –1.66 V, 0.80V, –2.93 V and –0.74 V respectively. The correct decreasing order of reducing power of the metal is :

(1) Ag > Cr > Al > K (2) K > Al > Cr > Ag

(3) K > Al > Ag > Cr (4) Al > K > Ag > Cr

NEET (UG) 2020

32. The number of Faradays(F) required to produce 20 g of calcium from molten $CaCl_2$ (Atomic mass of Ca = 40 g mol^{-1}) is :

(1) 4 (2) 1 (3) 2 (4) 3

33. On electrolysis of dil. sulphuric acid using Platinum (Pt) electrode, the product obtained at anode will be:

(1) SO_2 gas (2) Hydrogen gas

(3) Oxygen gas (4) H_2S gas

NEET (UG) 2020 (COVID-19)

34. Identify the reaction from following having top position in EMF series (Std.red. potential) according to their electrode potential at 298 K.

(1) $Mg^{2+} + 2e^- \rightarrow Mg(s)$ (2) $Fe^{2+} + 2e^- \rightarrow Fe(s)$

(3) $Au^{3+} + 3e^- \rightarrow Au(s)$ (4) $K^+ + 1e^- \rightarrow K(s)$

35. In a typical fuel cell, the reactants (R) and product (P) are :-

(1) R = $H_{2(g)}$, $O_{2(g)}$; P = $H_2O_{2(\ell)}$

(2) R = $H_{2(g)}$, $O_{2(g)}$; P = $H_2O_{(\ell)}$

(3) R = $H_{2(g)}$, $O_{2(g)}$, $Cl_{2(g)}$; P = $HClO_{4(aq)}$

(4) R = $H_{2(g)}$, $N_{2(g)}$; P = $NH_{3(aq)}$

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NEET (UG) 2021

36. The molar conductance of NaCl, HCl and CH_3COONa at infinite dilution are 126.45, 426.16 and 91.0 S cm^2 mol^{-1} respectively. The molar conductance of CH_3COOH at infinite dilution is.

Choose the right option for your answer.

(1) 201.28 S cm^2 mol^{-1}

(2) 390.71 S cm^2 mol^{-1}

(3) 698.28 S cm^2 mol^{-1}

(4) 540.48 S cm^2 mol^{-1}

37. The molar conductivity of 0.007 M acetic acid is 20 S cm^2 mol^{-1}. What is the dissociation constant of acetic acid ? Choose the correct option.

$$\begin{bmatrix} \Lambda^\circ_{H^+} = 350 S cm^2 mol^{-1} \\ \Lambda^\circ_{CH_3COO^-} = 50 S cm^2 mol^{-1} \end{bmatrix}$$

(1) 1.75×10^{-4} mol L^{-1} (2) 2.50×10^{-4} mol L^{-1}

(3) 1.75×10^{-5} mol L^{-1} (4) 2.50×10^{-5} mol L^{-1}

NEET (UG) 2022

38. At 298 K, the standard electrode potentials of Cu^{2+}/Cu, Zn^{2+}/Zn, Fe^{2+}/Fe and Ag^+/Ag are 0.34V, – 0.76 V, – 0.44 V and 0.80 V, respectively.

On the basis of standard electrode potential, predict which of the following reaction can not occur ?

(1) $CuSO_4(aq) + Fe(s) \rightarrow FeSO_4(aq) + Cu(s)$

(2) $FeSO_4(aq) + Zn(s) \rightarrow ZnSO_4(aq) + Fe(s)$

(3) $2CuSO_4(aq) + 2Ag(s) \rightarrow 2Cu(s) + Ag_2SO_4(aq)$

(4) $CuSO_4(aq) + Zn(s) \rightarrow ZnSO_4(aq) + Cu(s)$

39. Given below are half cell reactions :

$MnO_4^- + 8H^+ + 5e^- \rightarrow Mn^{2+} + 4H_2O$,

$E^\circ_{Mn^{2+}/MnO_4^-} = -1.510\,V$

$\frac{1}{2}O_2 + 2H^+ + 2e^- \rightarrow H_2O$, $E^\circ_{O_2/H_2O} = +1.223V$

Will the permanganate ion, MNO_4^- liberate O_2 from water in the presence of an acid ?

(1) No, because E°_{cell} = –0.287 V

(2) Yes, because E°_{cell} = +2.733 V

(3) No, because E°_{cell} = –2.733 V

(4) Yes, because E°_{cell} = +0.287 V

40. Two half cell reactions are given below :

$Co^{3+} + e^- \rightarrow Co^{2+}$, $E^o_{Co^{2+}/Co^{3+}} = -1.81\,V$

$2Al^{3+} + 6e^- \rightarrow 2\,Al(s)$, $E^o_{Al/Al^{3+}} = +1.66\,V$

The standard EMF of a cell with feasible redox reaction will be :

(1) +7.09 V (2) +0.15 V

(3) +3.47 V (4) –3.47 V

41. Standard electrode potential for the cell with cell reaction

$Zn(s) + Cu^{2+}(aq) \rightarrow Zn^{2+}(aq) + Cu(s)$ is 1.1 V. Calculate the standard gibbs energy change for the cell reaction. (Given F = 96487 C mol^{-1})

(1) –200.27 kJ mol^{-1}

(2) –212.27 kJ mol^{-1}

(3) –212.27 J mol^{-1}

(4) –200.27 J mol^{-1}

EXERCISE-II (Previous Year Questions) ANSWER KEY

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Answer	2	2	3	2	3	1	2	3	2	2	4	4	2	2	4
Question	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Answer	3	2	3	4	4	1	4	4	3	1	2	4	3	1	4
Question	31	32	33	34	35	36	37	38	39	40	41				
Answer	2	2	3	3	2	2	3	3	4	3	2				

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Exercise - III (Analytical Questions) Master Your Understanding

1. Given below are two statements:

Statement-I : In electrochemical cells, Gibbs energy of spontaneous redox reaction is converted into electrical work.

Statement-II : Gibb's energy can be calculated by using $\Delta G = -nFE$ & it is an intensive property.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both statement I and II are incorrect.

(2) Both statement I and II are correct.

(3) Statement I is incorrect but statement II is correct.

(4) Statement I is correct but statement II is incorrect

2. Given below are two statements:

Statement-I : Negative E° means that the redox couple has stronger reducing power than the H^+/H_2 couple.

Statement-II : Conductivity always increases with decrease in concentration both, for weak and strong electrolytes.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both statement I and II are correct.

(2) Statement I is incorrect but statement II is correct.

(3) Statement I is correct but statement II is incorrect

(4) Both statement I and II are incorrect.

3. Given below are two statements:

Statement-I : During the electrolysis of aqueous sodium chloride solution, the products are NaOH, Cl_2 and H_2.

Statement-II : The products of electrolysis depends on the different oxidising and reducing species present in the electrolytic cell and their standard electrode potentials.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both statement I and II are incorrect.

(2) Both statement I and II are correct.

(3) Statement I is incorrect but statement II is correct.

(4) Statement I is correct but statement II is incorrect

4. Given below are two statements:

Statement-I : Sodium can be obtained by the electrolysis of aqueous solution NaCl using platinum electrodes.

Statement-II : Copper metal can not reduce iron(II) ions in acidic solutions.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both statement I and II are incorrect.

(2) Both statement I and II are correct.

(3) Statement I is incorrect but statement II is correct.

(4) Statement I is correct but statement II is incorrect

5. Given below are two statements:

Statement-I : For strong electrolytes, Λ_m increases slowly with dilution and can be represented by the equation : $\Lambda_m = \Lambda_m^0 - b\sqrt{C}$

Statement-II : NaCl and $MgSO_4$ have same value of constant "b" in above statement.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both statement I and II are incorrect.

(2) Both statement I and II are correct.

(3) Statement I is incorrect but statement II is correct.

(4) Statement I is correct but statement II is incorrect

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6. Given below are two statements:
Statement-I : The conductance of one cm^3 of a solution is called conductivity.
Statement-II : The limiting equivalent conductivity of a weak electrolyte cannot be determined by extrapolation of the plot of Λ_m agains $\sqrt{C}$.
In the light of the above statements, choose the most appropriate answer from the options given below:
(1) Both statement I and II are incorrect.
(2) Both statement I and II are correct.
(3) Statement I is incorrect but statement II is correct.
(4) Statement I is correct but statement II is incorrect

7. Given below are two statements:
Statement-I : In the purification of a metal by electrolysis method, the impure metal is made cathode.
Statement-II : Dilute sulphuric acid on electrolysis liberates oxygen at anode.
In the light of the above statements, choose the most appropriate answer from the options given below:
(1) Both statement I and II are incorrect.
(2) Both statement I and II are correct.
(3) Statement I is incorrect but statement II is correct.
(4) Statement I is correct but statement II is incorrect

8. Given below are two statements:
Statement-I : The cell potential becomes half if the cell reaction is divided by 2 throughout.
Statement-II : Cell voltage is an extensive quantity.
In the light of the above statements, choose the most appropriate answer from the options given below:
(1) Both statement I and II are incorrect.
(2) Both statement I and II are correct.
(3) Statement I is incorrect but statement II is correct.
(4) Statement I is correct but statement II is incorrect

9. Given below are two statements:
Statement-I : Cathode is negative terminal in an electrolytic cell where as anode is negative terminal in a galvanic cell.
Statement-II : In a Daniel cell, electrons flow from zinc electrode to copper electrode in outer circuit.
In the light of the above statements, choose the most appropriate answer from the options given below:
(1) Both statement I and II are incorrect.
(2) Both statement I and II are correct.
(3) Statement I is incorrect but statement II is correct.
(4) Statement I is correct but statement II is incorrect

10. Given below are two statements:
Statement-I : The electrolysis of molten sodium hydride liberates H_2 gas at the anode.
Statement-II : In electrolytic refining of an impure metal, the pure metal is obtained at anode.
In the light of the above statements, choose the most appropriate answer from the options given below:
(1) Both statement I and II are incorrect.
(2) Statement I is incorrect but statement II is correct.
(3) Statement I is correct but statement II is incorrect
(4) Both statement I and II are correct.

11. Given below are two statements. Identify the correct choice from the following.
Statement I : Ionic molar conductivity at infinite dilution of $Na^{\oplus}$ ion is smaller than that of $K^{\oplus}$ ion.
Statement II : $Na^{\oplus}$ ion is more extensively hydrated as compared to $K^{\oplus}$ ion.
In the light of the above statements, choose the **most appropriate** answer from the options given below :
(1) Statement-I is correct and Statement-II is correct and is the correct explanation of Statement-I.
(2) Statement-I is correct and Statement-II is correct but not the correct explanation of Statement-I.
(3) Statement I is correct and Statement II is incorrect.
(4) Statement I is incorrect and Statement II is correct.

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12. Given below are two statements. Identify the correct choice from the following.

Statement I : Molar conductivity increases with decreases in concentration for weak electrolytes.

Statement II : Number of ions increases and number of ions per unit volume decreases due to dilution.

In the light of the above statements, choose the **most appropriate** answer from the options given below :

(1) Statement-I is correct and Statement-II is correct and is the correct explanation of Statement-I.

(2) Statement-I is correct and Statement-II is correct but not the correct explanation of Statement-I.

(3) Statement I is correct and Statement II is incorrect.

(4) Statement I is incorrect and Statement II is correct.

13. Given below are two statements. Identify the correct choice from the following.

Statement I : Increasing the concentration of Cu^{+2} ions increases the emf of Daniel cell.

Statement II : According to the Nernst equation

$$\text{EMF of cell} = E^0_{Cell} + \frac{0.059}{2}\log\frac{[Cu^{2+}]}{[Zn^{2+}]}$$

In the light of the above statements, choose the **most appropriate** answer from the options given below :

(1) Statement-I is correct and Statement-II is correct and is the correct explanation of Statement-I.

(2) Statement-I is correct and Statement-II is correct but not the correct explanation of Statement-I.

(3) Statement I is correct and Statement II is incorrect.

(4) Statement I is incorrect and Statement II is correct.

14. Given below are two statements. Identify the correct choice from the following.

Statement I : The cell constant of a cell depends upon the nature of material of the electrodes.

Statement II : The observed conductance depends upon the nature of the electrolyte and the concentration of the solution.

In the light of the above statements, choose the **most appropriate** answer from the options given below :

(1) Statement-I is correct and Statement-II is correct and is the correct explanation of Statement-I.

(2) Statement-I is correct and Statement-II is correct but not the correct explanation of Statement-I.

(3) Statement I is correct and Statement II is incorrect.

(4) Statement I is incorrect and Statement II is correct.

15. Given below are two statements. Identify the correct choice from the following.

Statement I : A cell reaction is spontaneous if E_{cell} = +ve

Statement II : For E_{cell} = +ve, ΔG cell is always –ve.

In the light of the above statements, choose the **most appropriate** answer from the options given below :

(1) Statement-I is correct and Statement-II is correct and is the correct explanation of Statement-I.

(2) Statement-I is correct and Statement-II is correct but not the correct explanation of Statement-I.

(3) Statement I is correct and Statement II is incorrect.

(4) Statement I is incorrect and Statement II is correct.

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16. Match **List-I** with **List-II**

List-I			List-II
(i)	Molar conductivity	(P)	$\frac{\text{Conductivity}}{\text{Molarity}}$
(ii)	Conductivity	(Q)	$\frac{\text{Conductivity}}{\text{Limiting molar conductivity}}$
(iii)	Degree of dissociation	(R)	$\frac{\text{Molar Conductivity}}{\text{Limiting molar conductivity}}$
(iv)	Solubility of sparingly soluble salt	(S)	Decreases with dilution

(1) (i) → P, (ii) → S, (iii) → R, (iv) → Q
(2) (i) → Q, (ii) → S, (iii) → R, (iv) → P
(3) (i) → S, (ii) → P, (iii) → R, (iv) → Q
(4) (i) → P, (ii) → R, (iii) → Q, (iv) → S

17. Match **List-I** with **List-II**

List-I		List-II	
(i)	During discharging of lead storage battery	(P)	Cell consists of zinc container as anode
(ii)	Energy of combustion is converted into electrical energy	(Q)	Conc. Of H_2SO_4 decreases
(iii)	Leclanche cell	(R)	Fuel cell
(iv)	Mercury cell	(S)	Cell potential remains constant during its life

(1) (i) → Q, (ii) → R, (iii) → P, (iv) → S
(2) (i) → R, (ii) → Q, (iii) → P, (iv) → S
(3) (i) → Q, (ii) → R, (iii) → S, (iv) → P
(4) (i) → Q, (ii) → S, (iii) → P, (iv) s→ R

18. Given :

$E^0_{Ag^+|Ag} = 0.80V$, $E^0_{Mg^{2+}|Mg} = -2.73V$,

$E^0_{Cu^{2+}|Cu} = 0.34V$, $E^0_{Hg^{2+}|Hg} = 0.79V$

Which of the following statements are correct.
(a) $AgNO_3$ can be stored in copper vessel.
(b) $Mg(NO_3)_2$ can be stored in copper vessel.
(c) $CuCl_2$ can be stored in silver vessel.
(d) $HgCl_2$ can be stored in copper vessel.
(1) a, b are correct (2) b, c are correct
(3) a, b, d are correct (4) a, d are correct

19. Any redox reaction would occur spontaneously, if
(a) the free energy change (ΔG) is negative.
(b) the $\Delta G°$ is positive.
(c) the cell EMF is negative.
(d) the cell EMF is positive.
(1) a, b are correct
(2) b, c, d are correct
(3) a, d are correct
(4) a, b & c are correct

20. Mark out the correct statement(s) regarding electrolytic molar conductivity.
(a) It increases as temperature increases.
(b) It experiences resistance due to vibration of ion at the mean position.
(c) It decreases as concentration increases.
(d) It increases with increase in polarity of solvent.
(1) a, b, c, d are correct
(2) a, b, c are correct
(3) a, c, d are correct
(4) a, b, d are correct

EXERCISE-III (Analytical Questions) ANSWER KEY

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Answer	4	3	2	3	4	2	3	1	2	3	1	2	1	4	1
Question	16	17	18	19	20										
Answer	1	1	2	3	3										